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ABSTRACT

This pamphlet deals with the role of vocational education in apprenticeship. Discussed in the first section are the nature and importance of apprenticeship, apprenticeable occupations, and the parties involved in apprenticeship programs. The bulk of the pamphlet describes various services provided by vocational education to apprenticeship programs, including evaluation and assessment services, associate degree programs, pre-apprenticeship exercises, curriculum development projects, instructor training and certification, related instructional courses, and advisory planning board participation. In the final section, several means for coordinating vocational education and apprenticeship programs are examined. A brief bibliography is appended. (MN)

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THE ROLE OF VOCATIONAL EDUCATION IN APPRENTICESHIP

Eric Rice

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I. General Nature and Organization of Apprenticeship

What is Apprenticeship?

Apprenticeship is a unique, voluntary training system through which individuals acquire trade and craft skills and knowledge. Training combines daily on the job instruction in manipulive skills with periodic classroom instruction in technical subjects related to work requirements. The training design provides for learning all required *practical* and *theoretical* skills and knowledges for the chosen skilled occupation. Practical aspects of work are mastered on the job as apprentices are rotated through all phases of their particular occupations. Theoretical aspects of work are mastered during related subjects instruction in the classroom. Related instruction continues throughout the apprenticeship term and provides an opportunity to consider, in depth, the underlying principles of job activities. This arrangement of on the job and classroom instruction is a standard part of typical apprenticeship indenturing agreements. It ensures the individual's employability and guarantees competent workers for industry by providing for learning the complete range of skills and knowledge during training.

The apprenticeship system stipulates requirements about the time period for training, pay, and performance expectations. For example, the required length of time for training ranges from one to six years, depending upon the specific trade. The majority of programs require three to four years of work and study to complete an apprenticeship. Since apprentices are full-time employees of the company in which they are apprenticed, the system includes a pay schedule for apprentices while they train. Usually the wage scale begins at about half of a journeyman's rate and increases progressively with satisfactory completion of work assignments and training segments. Near the end of the apprenticeship term, pay ranges from 90 to 95 percent of the full journeyman rate. The system also requires a formal written agreement between the apprentice and the program sponsor in which is set forth expectations, duties and obligations of each party for the apprenticeship term. Among items typically incorporated into the agreement are the provision for related instruction, overtime regulations, minimum wage schedule for each period in the apprenticeship term, and approximate time schedule for training in different aspects of the occupation.

Why is Apprenticeship Important?

For centuries apprenticeship has been a preferred method of training. Thousands of workers have been trained to perform effectively in high-skill and technical occupations to the advantage of both the individuals and program sponsors. For the apprentice the advantages for participating in the training system include the following:

1. Gaining varied skills through instruction and experience in all major aspects of a trade or craft;
2. Learning to work in harmony with different types of trades and crafts people in a work setting;
3. Learning to work within a company or work organization;
4. Learning about each skilled worker's part in the productivity plan of the industry and/or business;
5. Receiving a wage with regular increases while learning a skilled craft or trade;
6. Increasing employability and economic security; and
7. Receiving recognition as skilled workers, from peers, journeyman, employers and union members.

For the program sponsor, the advantages for participating in the apprenticeship training system include the following:

1. Developing and ensuring a supply of trained, skilled and knowledgeable workers and supervisors for their operations;
2. Increasing worker productivity, overall skill levels and versatility;
3. Lessening the need for supervision of employees by developing initiative, pride in craftsmanship, speed and accuracy in work; and
4. Continuing to attract a constant flow of capable men and women into the trade or craft.

Which Occupations are Apprenticeable?

Apprenticeship is a training system for learning any of the more than 700 apprenticeable trades or crafts. Included in the system are occupations such as machinist, plumber, fire medic, X-ray technician, die maker, water treatment plant operator, electrician, millwright and printer. Apprenticeable occupations generally are defined as those occupations for which (a) skills are primarily learned through a combination of on-the-job training supplement by related technical instruction, (b) requires at least 2,000 hours of work experience plus related instruction, (c) involves manual, mechanical or

technical skills and is practiced industry-wide as a recognizable trade or craft, (d) involves the development of a body of skills sufficiently well defined to be applicable throughout an industry and (e) does not primarily involve only selling, managerial, clerical or professional activities.

Who is Involved with Apprenticeship Programs?

The two parties most intimately involved with apprenticeship programs are individual apprentices and program sponsors. Apprentices are adult men and women who are full-time members of the work force while training through work and study to become even more proficient craftworkers. As apprentices, they are among a select group of workers. To be selected for apprenticeship, applicants must be able to physically to perform the work of the craft or trade, must meet minimum age requirements and usually must satisfy the program sponsor by test, interview and records that, as apprentices, they will profit from the training experience. For most trades and crafts, applicants must be high school graduates or must have earned high school equivalency certificates. Formal selection procedures are established by the sponsor and take into account equal opportunity provisions of Federal and state law.

The program sponsor plans, administers and pays for the program. Sponsors can be individual employers, groups of employers or combinations of employers and unions. Combinations of equal numbers of employers and unions are called joint labor management apprenticeship committees. The term often is shortened to Joint Apprenticeship Committee (JAC) or Joint Apprenticeship and Training Committee (JATC). The latter term, JATC, applies if the committee adminters a journeyworker training program to upgrade craftwork skills in addition to directing an apprenticeship program.

The sponsor sets policy concerning the conduct of the program. Jurisdiction includes selecting and indenturing apprentices, supervising training, establishing training curriculum and certifying apprentices as journeymen upon completion of the program.

Although most directly involved in the administration of apprenticeship programs, apprentices, local apprenticeship committees and/or corporate directors of training are not the only entities involved with an apprenticeship program. Other involved groups and organizations include the Bureau of Apprenticeship and Training (BAT) of the U.S. Department of Labor, the Federal Committee on Apprenticeship (FCA), the State and Territorial Apprenticeship Agencies (SACS) and the National Joint Apprenticeship and Training Committees.

The federal role, as authorized by the National Apprenticeship Act of 1937, is to promote labor standards that safeguard the welfare of apprentices and to guide, improve and assist apprenticeship. BAT maintains a field office

in every state and works with employers, unions and state apprenticeship agencies to develop programs and devise ways to give better training. The Bureau approves and registers programs, provides technical assistance to employers on training and searches out new ways to expand apprenticeship. BAT also encourages labor and management to determine future needs for journeymen as a basis for establishing apprenticeship programs. Further it encourages development of adequate eductional facilities and programs, promotes equal opportunity in the selection and employment of apprenticeship, conducts/sponsors studies of the system designed to improve its efficiency, distributes information related to aprenticeship and stimulates active support of effective programs among all pertinent organizations.

The federal role is enhanced by the activity of the Federal Committee on Apprenticeship, one of the oldest public advisory committees in the federal government. The Committee is composed of 25 persons appointed by the Secretary of Labor. They represent management, labor and the public. FCA advises the Secretary of Labor on concerns such as expanding apprenticeship and journeymen training in all sectors of the economy, increasing the effectiveness of equal opportunity programs, promoting labor standards to protect apprentices, improving relations/coordination with other training systems, identifying research needs and strengthening cooperative relationships with state apprentices and training agencies.

State and territorial apprenticeship agencies have been established in 32 states and territories. Ideally each receives policy guidance from an apprenticeship council composed of employer, labor and public representatives. Councils devise and oversee procedures for recognizing apprenticeship programs in the states. A number of SACs have staff to help employers and unions develop, expand and improve apprenticeship programs. Their work is carried on in cooperation with BAT. Each uses the BAT standards as the minimums for establishing programs but may add other state requirements in addition to the BAT specification.

National Joint Apprenticeship and Training Committees operate in a number of trades. They are composed of representatives of national employer associations and international labor organizations. These committees develop standards for their trades that serve as guidelines for local apprenticeship programs. Also, the committee encourage local affiliates to develop and conduct programs and provide them with information on need for apprenticeship, materials, changes in technologies and training methods.

Local apprenticeship programs may or may not be registered. Registration means formal recognition of a program by a state apprenticeship agency or by the Federal Bureau of Apprenticeship and Training. Programs can be registered upon request of the sponsors when certain basic criteria are met.

The benefits of registration include:

1. Assurance of a quality standardized training component;
2. Assurance of a progressively increasing wage scale;
3. Assurance of a specified term of training with clearly demarcated points for a record of assessment, promotion, and increasing breadth and depth of training;
4. Assurances of non-discrimination;
5. Assurances of a probationary period without penalty;
6. Greater jobs and security; and
7. Certification upon completion.

II. Types of Services Provided by Vocational Education to Apprenticeship Programs

A variety of relationships denote the association between the apprenticeship system and vocational education. The types of relationships include:

1. Evaluation and assessment services;
2. Associate degree programs;
3. Preapprenticeship experiences;
4. Curriculum development projects;
5. Instructor training and certification;
6. Related instruction courses; and
7. Advisory and planning board participation.

Apprenticeship programs use from all to none of these services. The most frequently used associations are those in which vocational education provides related instruction or advisory board participation. The most infrequently used associations are those in which vocational education provides assessment and evaluation services or associate degree programs. Regardless of the type of association, in each instance vocational education provides a prescribed and proscribed service to an individual or organizational apprenticeship client.

Evaluation and Assessment of Services

A viable but infrequently used service provided by vocational education to apprenticeship training is evaluation and assessment at either the programmatic or individual level. At the programmatic level, few state departments of vocational education offer evaluation or assessment services. A notable exception is Oregon where the State Department of Education has developed and administers a program assessment instrument in all education associated related instruction settings. Using the instrument, a researcher establishes empirical ratings about the efficacy of various aspects of related instruction including public relations, planning, record keeping, enrollment procedures, training methods and so forth. The resulting infor-

mation is used to plan and revise programs in order to insure currency and efficiency.[1]

A second type of programmatic assessment provided by vocational education is occupational analysis. For example, the Colorado State Board for Community Colleges and Occupational Education together with Colorado State University have produced occupational analyses for a number of trades including carpentry, plumbing, machine shop, and heavy equipment mechanics. Each analysis occupational outlines duties and tasks for entry-level workers and provides a summary rating for importance for each task, as determined by a sample of industry representatives. Materials also include suggestions about how to use the information in the instructional setting as well as several sets of performance objectives to aid in program planning.[2]

Individual assessment and evaluation services are provided by vocational education practicioners in several states. These services involve four types of activity:

1. Qualification and selection to the program;
2. Credit for prior experience;
3. Advancement during term of apprenticeship; and
4. Counseling and guidance.

In terms of qualifications and selection of individuals for apprenticeship programs, the overwhelming majority of national apprenticeship and training standards as developed by National Joint Apprenticeship Committees specifically provide that formal education experience and certification of schooling constitute a substantial portion of the score used in the ranking process for selecting applicants. The majority of standards allocate 20 to 25 percent of the total qualifying points to formal education and educational certification.[3] In several instances, the standard for Instructional Union of Electrical Workers for example, points are assigned not only for education, but also for specific participation in relevant shop and vocational education experience.[4]

Most programs offer advanced standing in apprenticeship for completion of prior work experience. However, based on information contained within the national standard for most industries, only about half of all programs offer equal credit for prior educational training that was correlated with related or supplemental instruction. When such credit is available, it is granted only with appropriate proof of documentation and test results.

Advancement during the term of apprenticeship requires successful progress in and completion of related and supplemental instruction. Evidence of progress is compiled by educational agency personnel from the results

of individual apprentice assessment and evaluation. The information is used to make decisions about pay grades, levels of responsibility and final certification.

The fourth area of assessment and evaluation, providing counseling and career information, is a service offered by personnel in many public schools in cooperation with local apprenticeship sponsors. For example, in California, local schools are charged with providing apprenticeship information and counseling through the auspices of the career guidance office. Such information not only encourages participation and interest in apprenticeship, but also provides a direct service to indentured apprentices.[5]

Some State and local education agencies provide information to counselors to assist the counselor in helping students make informed decisions about occupations and training options. For example, the Maryland Board of Education recently distributed a new addition of the *Maryland Apprenticeship Information Handbook* to counselors throughout the state. The handbook provides occupational information about dozens of jobs. Data about each occupation include job duties; work environment; scholastic, personal and physical requirements of the occupation; performance and attitude requirements; fringe benefits expected economic returns; job outreach and advancement prospects; work/training processes; and sources of additional information. The handbook is used to help students make informed decisions about their transition from school to work. It also promotes effectively, the apprenticeship training system.[6]

Associate Degree Programs

The idea of combining apprenticeship training and college study has matured during the past decade from experimental study to accepted practice. Initially, the International Union of Operating Engineers conducted an experimental study during the mid 1970's to test formally the feasibility of combining trade union apprenticeship with college study. The program involved over 2,000 apprentices, 17 unions and 70 community and residential colleges. Apprentices enrolled in college associate degree programs and took courses required as part of the related studies component of apprenticeship as well as courses designed to promote overall trade and personal growth. The idea was to furnish each participating volunteer apprentice with options for career and avocational opportunities and development. The average time period required to complete certification was three to four years. Findings from evaluations of the program revealed that not only did program participation improve the chances of the individual for promotion in the trade, but also it provided individuals with an opportunity to continue to upgrade their skill by later applying their Associate of Science degree toward additional educational certification.[7]

Today, the several dozen associate degree programs for apprentices that operate at various community colleges and technical institutes share several common elements that grew from the experimental study. For example, programs involve apprentices not only in related instruction, but also in a variety of other formal educational experiences that result in the award of an associate degree or credit toward an associate degree at the conclusion of the apprenticeship period. Many programs incorporate the apprentices into the regular college program and atmosphere. Most programs expect completion of the program to average three to four years, roughly paralleling the average time for apprenticeship.

Most programs operate as a cooperative effort between a single local educational agency and one or two large employers. For example, the Lorain County Community College Program serves two major employers, U.S. Steel and Bell System apprentices. The program offers related instruction as well as a variety of other general and technical subject matter designed to promote personal and work-related growth. Students attend classes on campus in four week blocks of time and, to the maximum extent possible, are intergrated into the regular student body. Students are paid on a regular forty-hour week basis to attend and successfully complete the classwork. Industry contributes tools, equipment, and training materials. They also provide instructors to teach specialized subjects. The college contributes facilities, program administration, planning, and instruction. Outcomes suggest that the program insures a level of academic competence in apprentices that enhances in-plant training while fulfilling related studies requirements. Also, the program provides specialized equipment to the college and helps faculty keep up-to-date on changes in industry.[8]

Perhaps the largest and most extensive associate degree program is operated by the Community College of Allegheny County (CCAC) of Pittsburg, Pennsylvania. The program actually is two programs in one—one a joint program for union construction trades and one an employer-only sponsored program for machine tool trades. In each, CCAC staff provides related instruction as well as other educational experiences. In addition to related instruction study available course work that counts toward the associate degree includes English, social science, human relations, natural science and the humanities. To earn an associate degree, an individual must complete 18 credit hours of course work in these subjects in addition to the prescribed coursework for earning journeyman papers and a certificate in their trade. The construction trades also have available several sets of extra courses through which to train foremen. Degree completion requires two nights of study per week for a three year period.

Findings from program evaluations have revealed that the programs are successful because the particular needs of the involved party are met. For the

apprentice, the program means an opportunity to earn journeymen papers and either an associate degree or certificate. It also affords trainees an opportunity to earn and learn, a probability of a supervisory position in time, and a top wage scale. For the employer-sponsor, the program means maintaining a solid pool of trained craftworkers. It also helps insure the know-how of new employees who participated in the programs, attract capable people into the trade, provides a source of future supervisory personnel, and relieves the employer of some of the burdens of training. For the college, it provides a source of students and a sense of mission.[9]

Preapprenticeship Experiences

A third type of association between apprenticeship programs and vocational education is the preapprenticeship program. A relatively new and potentially important type of program, preapprenticeship is a service arrangement in which the time of the student-trainee is divided equally between formal schooling and work. During each school day, seniors who usually have been vocational education students attend class to complete formal graduation requirements, to take additional vocational education courses and to study background information in mathematics and science associated with his or her job. On-the-job the trainee works as a part-time regular employee, learning the skills of the trade, producing goods and services, and earning a wage. Upon completion of formal schooling, often the trainee is indentured as a regular apprentice. Usually six months of advanced placement and credit in apprenticeship training term is provided to the trainee, based upon the preapprenticeship experience.

Initially preapprenticeship programs were stimulted through funding of experimental projects by the Bureau of Apprenticeship and Training and the Office of Youth Programs of the U.S. Department of Labor. Beginning in 1979, a total of eight experimental programs were funded in locations like Cleveland, Houston, Nashville and New Jersey. The primary occupations served in the program were machine trades such as tool and die makers, machinists, auto mechanics, press operators and compositors. The average cost per trainee per year was about $1,400.

Comprehensive evaluation of the experimental programs revealed that for the students who participated in the program, job satisfaction was very high, and performance ratings by supervisors were better than ratings earned by peers who did not participate in the program. Trainees were especially motivated by realizing that the job in which they were training and working was not a dead-end job.

Evaluation findings revealed that for the employers, satisfaction with the program was high. More than half of the participating employers recom-

mended the program to other employers as well as funded formal apprenticeship programs. Employers were pleased particularly by having an opportunity to screen new employees and by the prospect of having their own training operation.[10]

Stimulated by the success of the experimental programs, preapprenticeship programs recently have been begun under the aegis of state and local education agencies in Calhoun and Ingham Counties in Michigan, Cincinnati and Revanna, Ohio and Raleigh, North Carolina. The Calhoun and Ingham Counties, Michigan pilot programs are excellent examples of how local preapprenticeship programs can foster good relations among agencies. It began with collaberative efforts of the Michigan Bureau of Apprenticeship and Training, the area vocational schools and the local community colleges. Initial discussions of roles, responsibilities, authority, and funding arrangements of each agency eventually were formalized and specified in the form of contract. A joint oversight committee composed of representatives from labor, industry and the schools was formed to administer the program. The committee targets areas of concern, identifies necessary competencies and handles public relations. Each party has an equal share or stake in the ultimate success of this program.[11]

Not only have preapprenticeship programs been a successful training model for serving typical students, but also they have proven effective as a means of bringing special target groups of students into apprenticeship. For example, in Boston, Massachusetts a preapprenticeship program is geared toward helping young women enter the construction trades. In the Boston program, class sessions are held one evening per week. Content stresses preparation for apprenticeship selection qualifying examinations. Using sample tests, the enrollees work on verbal reasoning, mechanical aptitude, numerical reasoning, spatial relations, reading, and manual dexterity. The program is open entry—open exit, self-paced, and individualized so as to reach a maximum number of trainees and so as to allow for individual differences in abilities and experiences.[12]

Other preapprenticeship programs aimed at targeted populations provide an even wider variety of services. For example, the Lane Community College program of Eugene, Oregon provides preapprenticeship and concurrent services such as assessment and counseling in addition to providing introductory, related and general instruction. The mission of the program is to provide all the support services necessary to enable high risk apprentices and preappentices to be successful in apprenticeship program.

The program operates in four phases. In phase one, trainees are provided with an opportunity to explore several occupations, to gain background skills and knowledge in subjects like safety and blueprint reading, to complete diagnostic and remedial work, and to attend to interpersonal skills.

Phase two moves ahead to serious preparation for occupations. Manipulative skills are mastered and work habits and attitudes are emphasized. During this phase, joint committee members for various occupations observe trainees. Phase three provides a trainee with the opportunity to find an employer. Within the program, hands-on training is emphasized. Trainees are encouraged to participate in coop work experiences. The idea is to insure that trainees will be productive employees from their first day on the job as apprentices. Phase four occurs when the trainee enters apprenticeship training under agreement with the appropriate joint apprenticeship committee.[13]

In some geopolitical areas such as Florida and Oregon, preapprenticeship has become an official statutory responsibility of the State Education Agency. In Florida, for example, state law requires the State Education Department to assist local education institutions to create programs that permit participants to earn a high school diploma while receiving credit toward their apprenticeship term as they continue their work and study. The law further stipulates that each program will have a craft advisory committee and will utitlize instructors well qualified in their trade.[14]

Given the continued emphasis on increasing productivity, advancing technology and more efficient methods of training, the preapprenticeship model of training will increase in favor.

Curriculum Development Projects

Curriculum development is a more frequent type of association between vocatonal education and apprenticeship and training. Dozens of state and local education agencies provide services in this area. Typical projects range from production of related instruction materials to production of curriculum for entire training projects. For example, the Utah State Board for Vocational Education, in conjunction with qualified tradesmen and industry representatives, have developed a set of materials for instructors to use as texts for related studies. *The Plumbing Guide*, for example, is a four-year course of materials dealing with subjects ranging from related mathematics to plumbing codes. The guide provides lesson-by-lesson directions for the instructor. It lays out the purpose of each lesson, required resource materials, and specific information points to emphasize. Each set of materials comes in four parts: (a) a general outline for the curriculum; (b) the instructor's guide; (c) the study guide; and (d) unit tests and final examinations.[15]

A very extensive set of occupational specific curriculum materials for related instruction training has been prepared by the California State Department of Education. Originally developed at the request of industry, the materials were written in conjunction with union and industry represen-

tatives. The materials are available for a multitude of trades. Teacher and student editions are available for each set of materials. The student editions include narrative content, worksheets, and performance tests. The materials utilize an individualized study format and are intended to promote independent study. Teacher guides include resources, major points of emphasis and answers to performance tests.[16]

Curriculum development by different education organizations has resulted in a wide variety of products. For example, the State Education Department and the State University of New York has developed two sets of materials. One set is a series of trade specific syllabi for instructor use. Each syllabus contains instructional objectives, content and teaching suggestions. The second set of materials is a *Core Curriculum of Related Instruction for Appentices*. It is a comprehensive set of teacher guides that lay out content, objectives, background information and references. The series is designed to serve as a core curricumum across all apprenticible occupations. It includes booklets about safety, mathemtics, communications, industrial relations and economics.[17]

A second variation in curriculum design recently has been completed by the Curriculum and Instructional Materials Center of Stillwater, Oklahoma. They have produced a set of competency-based training materials for the Associated General Contractors of America. The materials have been approved by the Bureau of Apprenticeship and training as the Model for Unilaterial Training Program Standards for the open shop sector. Materials include instructor guides; trainee work sheets; competency tests; and a set of guidelines on "how to" organize, operate, fund, and manage a unilateral trainee program.[18].

The third variation of curriculum development has been produced by the North Carolina Department of Community Colleges and Technical Institutes. Staff compiled and grouped appropriate community college/technical institute courses by trade, by specific content within subject matter and by course outline in order to provide planning information to apprenticeship program sponsors and local college officials.[19]

A fourty type of curriculum product is a program-specific set of materials as used by a single sponsor and local educational organization. Such products range from course outlines to trainees workbooks. For example, at the Henry Ford Community College of Dearborn, Mighican, the College's Related Instruction Division has prepared comprehensive course outlines for all courses. The outlines provide the framework for a lesson plan for each class meeting. Outlines prescribe topics for class consideration, performance goals and objectives, trainee study and work assignments, time allotments for covering information, and evaluation requirements. The materials are designed to insure continuity in apprentice training and consistency of learning outcomes for all apprentices and classes.[20]

Each of these several variations on curriculum development by vocational education has resulted in materials that are immediately useable by the apprenticeship community.

Instructor Training and Certification

Another association between vocational education and apprenticeship and training programs is the training and certification of apprenticeship instructors, coordinators and administrators. This association is prescribed by law in a number of states including Wisconsin, Kentucky, Washington and Massachusetts. The association is the focus of several state-wide training programs in states such as Maine, California, Indiana and Pennsylvania. The association is the origin of several special training programs at institutions like Purdue University, The Pennsylvania State University, The Ohio State University, and the Texas A & M University Engineering Extension Service.

State departments of education frequently set certification requirements and give credit for both experience in the trade and formal education course work. In Massachusetts, for example, the Department of Education regulations set forth minimum qualifications for instructor selection is order to insure that apprenticeship instructors have the minimal basic teaching competencies along with trade experience. Among the provisions of state regulations are specifications requiring that apprentice-related training instructors have a high school diploma or equivalent, the necessary knowledge and skills of practicing journeyman, and two additional years of trade experience. Instructors in evening trade programs have even more stringent requirements. To qualify, instructors must have a license to teach a trade with preference for a college degree; specified periods of work experience; and acceptable scores on performance tests. While adult vocational instructors are not required to hold a certificate, they must meet the provisions of the state plan for vocational education.[21]

In California, the Ryan Act requires that part-time related instructors working in state secondary industrial education system be approved for the Designated Subjects Teaching Credential (DS). The DS requires an apprentice instructor to possess a qualifying experience such as completion of his or her own indentured apprenticeship in combination with a minimum of two additional years of work experience. In addition, each instructor must complete a 60 hour Techniques of Teaching course offered by the Division of Vocational Education in cooperation with the California State Department of Education. The course if offered at locations throughout the state and meets in the evening or on Saturdays, once a week for 20 weeks. Full-time instructors have more stringent rerquirements. They must demonstrate occupational proficiency through successful completion of a battery of written

and manipulative tests. In addition, they must complete a 9-semester unit personalized in-service training program and meet minimum citizenship provisions.[22]

Formal training programs designed to meet certification and selection requirements are available in all states that require such certification. Until recently, most certification and/or qualifying programs were available only through university-based, degree granting options. Increasingly, these programs now offer innovative, fieldbased options. For example, the University of Maine and the Maine Department of Educational and Cultural Services sponsor training programs for related subjects instructors. Based on an assessment of need for teaching skills, a set of individualized training materials have been adapted specifically for the target population of instructors. Content is delivered through field-based institutes, workshops, correspondence study and formal classwork, depending on location throughout the state. The result has been to improve the pedagogical skills of new instructors.

In Indiana, a new field-based program for training trade teachers has been initiated at a half-dozen locations throughout the state. The program is based on the proposition that to function as effective trade or technical instructor, the trainer must be competent not only in the trade that he or she is teaching but also must use appropriate teaching skills to transmit knowledge and facilitate learning for others. The program is intended specifically for technical teachers who have not had the opportunity to gain teaching competencies prior to employment. The program is offered over several years. Upon successful completion of the 65 semester-hour training course the instructor receives an Associate of Applied Science Degree in Trade and Technical Teaching.

Institutional programs are geared more toward training than certification of related training instructors. For example, the Purdue University trains approximately 1,000 instructors a year from the United Association of Plumbers and Pipefitters during an annual summer program. Now in its twenty-ninth year, the program is a five year, 200 hour training effort that results in certification as an instructor of journeymen and apprentices. Each annual workshop combines equal 20-hour parts of coursework designed to upgrade technical trade skills in subjects like electricity, steam technology, code/standards, and materials with coursework designed to improve pedagogical practice in related instruction. Instruction in training skills includes work on testing, presenting information, planning instruction, developing objectives and principles of learning.[23]

The Texas A & M Engineering Extension Service utilizes a different delivery model to provide training to related instructors. The Engineering Extension Service offers training through field-based mini-courses. The

mini-courses are organized as three, twelve hour courses, each of which takes a week to complete. The Extension Service provides instructors and texts for the mini-course in response to local requests. Topics of the courses are "Analysis and Instructional Materials Development," "Use of Aids and Equipment" and "Methods of Teaching Vocational Subjects." The transportability and relative low cost of the program has made it popular. On an average, they offer 30 to 35 iterations of the program each year.

Training of coordinators and administrators typically is less formal than that of instructors. Usually it consists of providing information related to conducting apprenticeship programs to a reader to assist the reader in performing their specific job. For example, in Kentucky, the Department of Education has prepared and distributed a booklet entitled, *Kentucky, Apprenticeship Information for Counselors of Youth*. The document deals with career education needs of students as addressed by counselors. The booklet provides an overview of apprenticeship, of apprenticable trades, and of procedures for directing students toward such objectives.[24] Other materials have been generated to instruct appreticeship coordinators and administrators about the performance of their duties. For example, Virginia Department of Education staff has written a manual for coordiators. It provides directions for keeping records, outlines qualifications and selection procedures for coordinators, explains the organization of the state system, defines state education policy on enrollment and reimbursement, and suggests course outlines for certain core subjects.[25] In Hawaii, education agencies are mandated by state statute to provide related instruction through the auspicies of vocational/technical education in the community college system. Toward that end, the State Education Agency developed a handbook to instruct educational personnel and program administrators about appropriate roles, responsibilities and options regarding conduct of related instruction programs.[26] Even more comprehensive is New York state's "*Administration of Apprenticeship Training*." Prepared by the University of the State of New York, the booklet discusses the law; helps to standardize administration by explaining forms and reimbursement procedures; provides general information about a variety of topics; and discusses specific day-to-day routines and procedures expected in the conduct of apprenticeship related and supplemental instruction programs.[27]

Related Instruction Programs

The most frequently used service provided by vocational education to apprenticeship is related instruction. Related instruction is the "classroom" portion of apprenticeship and is critical to the efficacy of the overall training system.

Related instruction as part of apprenticeship training is provided for in the rules and regulations of the National Apprenticeship Act. The Standards require that a minimum of 144 hours per year of apprenticeship training be provided to each trainee in relted and supplementary subjects. This period of time can be increased in the United States by trade and craft standards if content warrants the increase. Some industries require as much as 200 to 300 hours yearly in related subjects study by apprentices.

The content of related subjects instruction, like the number of hours required, varies by trade or craft. In general the subjects taught include (a) theory, principles and technical knowledge needed on the job; (b) auxiliary information that assists a worker to better accept and discharge his or her responsibilities; and (c) occasional manipulative skills that are important to the craft or trade but are not provided conveniently in the apprentice's on-the-job training. Often this means that related subjects instruction includes the principles, concepts and applied information that apprentices must know and use from subject matter such as mathematics, general physical sciences, safety, basic measurement, and sketching/blueprint reading. Such information is in addition to study of trade-specific materials and work processes and procedures. Related subjects instruction helps to ensure that workers can communicate effectively on the job, can work well in organizations, and know about the apprenticeship system. However, regardless of the trade, craft or situation, the subject matter is current to job demands, practical, applied and directly useful in working in the craft or trade.

Related subjects instruction is an important portion of the apprenticeship training system. Overtime work is not permitted if it interferes with related instruction attendance. More importantly, in order to earn journeyman certification, an apprentice must attend *and* successfully complete the program of related studies. Apprentices, while not always enthusiastic about attending in the early stages of training, are encouraged to take the instruction seriously. In those occasional instances when apprentices fail to fulfill their related subjects responsibilities, sponsors are authorized and required to take appropriate disciplinary action. Conversely, apprentice advancement in pay grade and responsibility is based in part on performance in related instruction.

While some industries have created their own industry-specific daytime, paid, related subjects intructional program, most related subjects instruction is provided in the evening through programs that neither pay apprentices for time nor provide formal school credit. Frequently instruction is offered in conjunction with public secondary and post secondary education organizations. Instruction is provided in a variety of settings including typical classrooms; shops or laboratories; the work place; the

library; the training facility; or the union hall. Sometimes, particularly in rural areas, related instruction takes place in the apprentice's home through independent study arrangements or correspondence courses of equivalent value to other courses of study.

Evidence suggests that the ways in which education agencies are involved in providing related subjects instruction are similar throughout the United States. For example, vocational education facilities at the secondary and post secondary levels are the sites most frequently used to hold related instruction classes. In rural areas where facilities are sparce and the numbers of apprentices small, vocational educators often provide correspondence instruction services in place of facilities. Both facility-based on correspondence programs use instructional materials developed, in part, by vocational educators. Additionally, many apprenticeship programs use vocational educators to teach related subjects courses. Further, apprentices usually are counted among the enrollment of the educational institution with the result that some portion of the instructor's salary is funded through vocational education monies.

In states like Connecticut, Florida, California and Wisconsin, the state education agency has extensive statutory responsibilities for the provision of related subjects instruction. In Connecticut, for example, the Division of Vocational-Technical Schools of the State Department of Education is the primary provider of apprentice related instruction. The program is totally funded by the state's general fund. Instruction usually is provided in the network of state technical schools.

In Florida, the administration and supervision of related and supplemental instruction for apprentices, coordination of such instruction with job experiences, and selection and training of teachers, all as approved by the registered program sponsor is the responsibility of the appropriate vocational education institution. The institution is expected to provide facilities, equipment, supplies and instructor salaries for related instruction for registered apprenticeship programs.[28]

In Wisconsin, the State Vocational, Technical and Adult Education (VTAE) is charged with the responsibility of providing related instruction to the state apprentices. Approximately 99 percent of apprentices in the state receive their training through VTAE. However, unlike other states where related instruction is offered at night, in Wisconsin, apprentices usually attend class for an eight hour day, one day a week, 50 weeks a year. Most apprentices must achieve passing grades and attend at least 80 percent of the class sessions in order to receive full credit for related instruction. Unlike most states, in Wisconsin, employers pay a day's wages for apprentice attendance in related instruction.

Actual training in related instruction in Wisconsin parallels effective instruction in other states. Materials usually are competency based and written in modular format. They deal with theory and application of information needed on the job. The actual content of each course is determined by the schools with the advice of local apprenticeship committees and state vocational and labor representatives. Instructors are VTAE instructors each of whom is a skilled craftsperson, former apprentice and experienced teacher. In addition, Wisconsin utilizes a core of "circuit teachers" who travel throughout the state teaching specialized courses to apprentices.[29]

Advisory and Planning Board Participation

A final area of association between vocational education and apprenticeship programs is advisory and planning board participation. Evidence suggests that this education is increasingly common and that it occurs in a similar fashion across states. For example, many states have a representative for apprenticeship on the State Advisory Council for Vocational Education. Conversely, many State Apprenticeship Committees provide for representation by a vocational education official. Vocational education representation also is provided for on the Federal Committee of Apprenticeship.

Within state education agencies, each division for vocational education has an individual designated as the state liaison for apprenticeship. The liaison is responsible for coordinating information exchange regarding programs, services and policies between vocational education and the apprenticeship community. Particular concerns include not only interaction at the state level, but also providing program assistance to local education agencies and apprenticeship sponsors.

III. Means of Coordination

The cement that fixes the associative relationships of vocation education and apprenticeship ranges from state statute to contract to convenience. For example, many services provided by vocational education at the local level have grown from sponsor inquiries about the capabilities of the local vocational program. Most sponsors initially contact education officials because sponsors are encouraged by national standards, tradition and convenience to seek out and coordinate at least the related instruction component of apprenticeship with vocational education officials.

Over time programs have moved to formal contracts between the sponsor and the vocational education. Contracts usually prescribe and proscribe the services, responsibilities and authority of each party.

The most formal and yet diverse prescriptions of association are provided for in state law. While some states and territories have little or no formal legislation regarding the role of vocational education and apprenticeship, most states now have legislation that addresses one or more of the issues of roles, responsibilities, authority, organizational structures, and funding for the agencies and organizations involved with the training systems.

Florida, New York, Wisconsin and Oregon legislation is among the most comprehensive in the nation. Each prescribes and proscribes the role of vocational education and apprenticeship. For example, state law in Florida provides for a State Apprenticeship Advisory Council of twelve (12) members including the cognizant state education official. The law not only outlines the administrative duties and registration responsibilities of the State Division of Labor but also provides that the State Department of Education will administer and supervise related instruction, coordinate such training with job responsibilities, select and train teachers and coordinators, and provide facilities, equipment, supplies and instructor salaries for related studies.[30]

In New York, state law provides that the Industrial Commissioner is responsible for apprenticeship. The Commissioner is advised by a State Apprenticeship and Training Council and is responsible for promoting, developing, registration, maintaining, servicing, certification, and approving programs. The New York State Education Department is responsible for providing related and supplemental instruction. Law requires that

related instruction must be made available to each program or apprentice as a prerequisite for registration. Education Department responsibilities include arranging for classes, certifying completion, supervising efforts, determining effectiveness, approving advanced credit, conducting classes, and handling the issue of funding.[31]

In Oregon, for example, law specifies responsibilities, organizational structures, and authority for a variety of agencies and organizations. The responsibilities of the Department of Education are to coordinate related instruction operated by community colleges with on-the-job instruction; to cooperate to establish preapprenticeship training; and to assist in creating policy for prior experience and performance achievements. The State Department of Education also must create/administer policy for (1) courses of study, (2) operation of related instruction, (3) teacher training requirements, (4) teacher training experiences, (5) credit for apprenticeship training, and (6) evaluation of prior work for college credit.[32]

In Wisconsin, legislation is even more comprehensive. Not only are the roles, responsibilities and authority for apprenticeship, vocational education, CETA and employment services outlined, but also the law provides for relative equality of related instruction and on-the-job training by requiring pay and credit for hours spent in related instruction as administered by vocational-technical education.[33]

Regardless of how the vocational education-apprenticeship association is formalized, the important point is that there are a variety of services that vocational education can and should provide to apprenticeship. These services include evaluation and assessment, associate degree programs, preapprenticeship experiences, curriculum development projects, instructor training and certification, related instruction courses, and advisory and planning board participation. Service models for each type of activity currently operate in the United States. They can be used for ideas or can be replicated in vocational education's continuing effort to provide skilled workers for the industrial base.

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